

# Bioengineered Tomatoes Taste Great

**A** tasty new tomato boasts more of the hearty, vine-ripened flavor that's often missing in its supermarket counterparts.

The bioengineered Endless Summer tomato is a result, in part, of work by ARS and University of California at Berkeley researchers. They found, copied, and rebuilt a gene that lets these tomatoes stay on the vine without softening and spoiling. That means the high-tech fruit can develop more of the sugars and acids that make a home-grown tomato taste so sweet and rich.

DNA Plant Technology Corporation (DNAP) of Oakland, California, licensed the gene and used that research, plus the company's proprietary technology, to create Endless Summer tomatoes. Earlier this year, the big, juicy tomatoes were test-marketed in New York.

DNAP business development director Dave Rochlin estimates that they may be on sale in supermarkets throughout the country by 1997.

Typically, supermarket tomatoes have to be harvested while they're green and hard. That's so they won't bruise and rot on the long trip from grower to grocer.

Perhaps most important, they're picked before they can begin to form a natural ripening hormone, ethylene. Once ethylene—a colorless, odorless gas—kicks in, so do all the problems of perishability. Ethylene also triggers natural ripening and spoilage of hundreds of other kinds of fruits and vegetables, like bananas, melons, lettuce, and apples.

In Endless Summer tomatoes, the gene that would ordinarily help the plant make ethylene is retooled, to

suppress almost all ethylene production. Because the tomatoes form virtually no ripening gas, there's no need to hurriedly harvest immature fruit.

When exposed to ethylene gas in the warehouse—the procedure used to ripen commercial tomatoes—Endless Summer tomatoes soften, turn red, and stay plump and fresh for

ARS plant physiologist Athanasios Theologis at the ARS/University of California Plant Gene Expression Center, Albany, and co-researcher Takahide Sato isolated and cloned the ripening gene. Normally, the gene cues tomatoes to produce an enzyme called ACC synthase. To make ethylene, plants need that enzyme.

Theologis and Sato did the work in 1989 and applied for a patent. In lab and greenhouse experiments that followed, Theologis and other colleagues blocked 99.5 percent of all ethylene production in about 100 tomatoes by remaking the ACC synthase gene.

His team reported their success in an article that garnered the cover of *Science*, one of the world's leading research journals.

DNAP and two other companies, Calgene, at Davis, California, and Monsanto, in St. Louis, licensed the gene. But DNAP is the first to market a gene-engineered tomato that's derived from the Albany work. The DNAP license permits the gene's use not only in tomatoes, but in about a dozen other produce section favorites as well.

DNAP's bioengineered banana—one that won't turn brown and squishy before you've had a chance to put it on your breakfast cereal—is already in the works.—By **Marcia Wood, ARS.**

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A retooled gene in Endless Summer tomatoes controls ripening to give better flavor and shelf-life. (K5914-1)

about 4 weeks. That's 2 weeks longer than most grocery store tomatoes.

"The longer shelf-life," says DNAP's Rochlin, "means we can ship a consistent supply of these superb tomatoes."